REMARKS

Claims 1-15 and 21-25 are pending in the application.

Applicant notes with appreciation the reopening of prosecution after filing of Applicant's Appeal Brief and the withdrawal of the previous rejections. Applicants respond herein under 37 CFR 1.111 to the non-final Office Action mailed May 03, 2004.

Claims 1-15 and 21-25 have been rejected in the Office Action to which the present Reply is responsive. Applicant respectfully traverses these rejections. Based on the present Reply, Applicant respectfully requests reconsideration and withdrawal of the rejections of Applicant's claims, and passage of the present application to allowance and issue.

REJECTIONS OVER HATTORI IN VIEW OF YAMAGUCHI AND TSENG

In the Office Action, claims 1-15 and 21-25 were rejected under 35 U.S.C. § 103(a) as obvious over Hattori et al. (U.S. Patent 6,252,294) in view of Yamaguchi et al. (U.S. Patent 6,271,541) and Tseng. The Examiner asserted that Hattori teaches various elements of the claimed invention, but admitted that Hattori et al. fails to teach all the features of the claimed invention. The Examiner cited and relied upon Yamaguchi et al. in order to remedy the admitted deficiencies of Hattori et al. with respect to claims 1, 9 and 21. The Examiner relied upon Tseng for the remaining features of Applicant's claims. Applicant respectfully traverses the rejections over Hattori et al. in view of Yamaguchi et al. and Tseng for at least the following reasons.

There Can Be No Prima Facie Obviousness, Since the Combined References Fail to Provide Any Motivation to Combine and Modify the Prior Art as Contended, and There is No Reasonable Probability of Success.

The Examiner contended that Hattori et al. teaches a process similar to that claimed by Applicant, but admitted that Hattori et al. fails to disclose the gettering plug comprising doped fill material containing a plurality of gettering sites, as recited in independent claims 1, 9 and 21.

In order to make up for some of the deficiencies of Hattori et al., the Examiner contended that the newly cited reference Yamaguchi et al., discloses gettering plugs comprising doped polysilicon.

Then, having assembled the selected elements from the prior art in order to allegedly find all of the elements of Applicant's claimed invention, in conclusory fashion the Examiner stated "It would have been obvious to one of ordinary skill in the art of making semiconductor devices to combine the teaching of Hattori et al. and Yamaguchi et al. to enable the gettering plug comprising doped fill material of Hattori to be formed and furthermore to remove the heavy metal impurity by gettering." Applicant traverses the rejection of claims 1, 9 and 21 and the claims dependent thereon for at least the following reasons.

This rejection fails, both on a factual basis and on a legal basis to state a *prima facie* case of obviousness. All of the legally required elements of a prima facie case of obviousness have not been shown. Specifically, the Examiner failed to identify any motivation for making the contended selection and combination and failed to show any reasonable expectation of success. There is nothing in these references or in anything identified by the Examiner that shows the requisite motivation for making the asserted combination and modification. Applicant respectfully traverses, and requests the Examiner to reconsider and withdraw these rejections.

Hattori et al. teaches the use of polysilicon in "cutting regions" as gettering structures. Hattori et al. fails to disclose or suggest that the polysilicon should be doped and fails to disclose or suggest that doped polysilicon would perform any better as a gettering structure. At no time does Hattori et al. disclose or suggest that the polysilicon be doped for *any* reason. As noted in the previous Replies and in the Appeal Brief, polysilicon is disclosed by Hattori et al. as the gettering material for all of its disclosed embodiments. There is neither disclosure nor suggestion by Hattori et al. that the polysilicon could or should be doped. Hattori et al. therefore fails to provide any motivation whatsoever for modifying its specific teachings from the use of polysilicon to the use of any other material.

Based on the teachings of Hattori et al., a person of ordinary skill in the art would clearly understand that polysilicon is an adequate gettering material. The person would have no motivation to change from polysilicon to *any* other material for gettering in an SOI device.

Yamaguchi et al. discloses a plurality of non-doped polysilicon gettering structures, and *some* doped polysilicon structures that perform a dual purpose: first, as current-carrying active

elements of the semiconductor device, and second, as additional, secondary gettering structures. Because these are current carrying structures, any person of ordinary skill in the art would understand that *the dopant is present to increase the current-carrying capability of the polysilicon, not to enhance the gettering capability thereof.* Yamaguchi et al. fails to disclose or suggest that doped polysilicon provides any better gettering than polysilicon. The doping in the polysilicon is for the conventional purpose of increasing the conductivity of the structures formed of doped polysilicon. At no time does Yamaguchi et al. ever suggest that doped polysilicon acts any better as a gettering material than non-doped polysilicon.

Thus, there is no motivation in Yamaguchi et al. that can reasonably be contended to have motivated a person of ordinary skill in the art to use the doped polysilicon of Yamaguchi et al. as a substitute for the non-doped polysilicon of Hattori et al. This is particularly true because the scribe line gettering structures of Hattori et al. are not current carrying structures which need doping to increase their conductivity or for any other known purpose. The scribe lines are in fact sacrificial structures. For this additional reason, no person of ordinary skill would be motived to add a further production step to dope the polysilicon structure of Hattori et al. Doing so would be seen as counterproductive, since it would needlessly add to production costs.

Based on the teachings of Yamaguchi et al., a person of ordinary skill in the art would clearly understand that polysilicon is an adequate gettering material, and that if a polysilicon structure had to be doped for any other reason, such structure could still function as a gettering material. However, the person would have no motivation to dope the polysilicon to improve its gettering capability, because there is no teaching or suggestion anywhere in Yamaguchi et al. or any cited prior art to do so.

Thus, the person of ordinary skill would have had no motivation to change from polysilicon to any other material for gettering in an SOI device based on Yamaguchi et al..

Yamaguchi et al. discloses *non-doped* polysilicon as the *only* gettering material in four of six disclosed embodiments, and discloses *non-doped* polysilicon as the *primary* gettering material in the other two embodiments. Thus, even when Yamaguchi et al. states that a doped polysilicon structure acts as a gettering site, it is *only* a *secondary* gettering structure, *not* the

primary gettering structure, and its function as a gettering site is secondary to its primary function, which is to carry current. A person of ordinary skill in the art would understand from the disclosure of Yamaguchi et al. that doping of the gettering structure is incidental to its gettering function. There is *nothing* in Yamaguchi et al. to suggest that the doping improves the gettering in any way. The following discussion clearly shows there is nothing in Yamaguchi et al. to suggest any gettering benefit from the doping.

Specifically, in Fig. 1, as described from col. 6, line 38 to col. 7, line 35, both regions 17 and 18 are non-doped polysilicon and act as gettering sites. These are the primary gettering sites because these regions are directly adjacent the SOI region from which impurities are to be gettered. The doped polysilicon plugs (no separate reference numeral) filling the contact holes 13 and 15 are separated from the SOI region by the primary gettering regions 17 and 18. The plugs filling the contact holes 13, 15 can also act as a gettering site. Any impurities must first migrate from the channel 5, the drain 8 or the source 9 into the primary gettering regions 17 and 18 and *may* eventually migrate to the plugs filling the contact holes 13 and 15.

In the embodiment of Fig. 2, the *only* gettering structure are the polysilicon regions 19 and 20, as disclosed from col. 7, line 36 to col. 8, line 31. There is *no* doped polysilicon in the device shown in Fig. 2. There is *no* indication that this structure getters any less efficiently than any of the other embodiments. There is *no* indication that the device 51 suffers any drawback due to the lack of doped polysilicon in the gettering structures 19 and 20.

In the embodiment of Fig. 3, like the embodiment of Fig. 2, primary gettering is provided by the non-doped polysilicon plugs 19 and 20. In the embodiment of Fig. 3, like the embodiment of Fig. 1, the contact holes 13 and 15 are filled with a doped polysilicon plug and act as a secondary, additional gettering site, as disclosed at col. 8, lines 32-42. While this does provide an added gettering structure, there is *still no* indication or suggestion that the doped polysilicon works any better as a gettering material than does non-doped polysilicon. The only benefit ascribed by Yamaguchi et al. to the material filling the contact holes 13, 15 is that it provides an additional (secondary) gettering site. There is *no* suggestion of any improved gettering by the doped polysilicon relative to the non-doped polysilicon.

In the embodiments of Figs. 4-6, the gettering function is provided by the non-doped polysilicon plug 23. Each of these embodiments includes a metal plug 21, 22 filling the contact holes 13, 15. There is *no* doping of any gettering structure in any of these embodiments. There is *no* indication that any of these structures getter any less efficiently than any of the other embodiments that include doped polysilicon. There is *no* indication that any of the devices suffer any drawback due to the lack of doped polysilicon in the plugs 23.

In the embodiments of Figs. 7 and 8, a crystal defect region 27 performs the gettering function. Both of these embodiments include a metal plug 21, 22 filling the contact holes 13, 15. There is *no* doping of any gettering structure in either of these embodiments. There is *no* doping of any gettering structure in either of these embodiments. There is *no* indication that either of these structures getters any less efficiently than any of the other embodiments that include doped polysilicon. There is *no* indication that either of the devices suffer any drawback due to the lack of doped polysilicon in the gettering regions.

As shown by the foregoing, Yamaguchi et al. discloses polysilicon as the primary or only gettering material in *every* embodiment (except Figs. 7 and 8, which use crystal defect region 27) and only discloses a doped polysilicon structure (e.g., the contact hole filling material 13 in Figs. 1 and 3) that acts *primarily* to carry current and *only secondarily* as a gettering structure. Clearly, Yamaguchi et al. considers that the doped polysilicon acts as a gettering site due to the fact that it is polysilicon, *not* because it is doped. Clearly, in Yamaguchi et al. the dopant is present to increase the conductivity of polysilicon, as is well known in the art.

The *only* teaching of improved gettering from doping is in Applicant's own specification, *not* in Hattori et al. and *not* in Yamaguchi et al.

The foregoing proves that Yamaguchi et al. fails to even suggest that the dopant is present to, or does in fact, enhance gettering. The proof lies in the fact that in some embodiments the same, corresponding structure is formed of a material (the metal filling contact holes 13, 15) that does not getter at all. That is, in all of the embodiments of Figs. 2, 4, 5, 6, 7 and 8, the contact holes 13, 15 are filled *not* with doped polysilicon but with another conductive material, the metal plugs 21 and 22. Obviously the metal plugs 21 and 22 are not going to act as a gettering site.

Both the metal plugs 21, 22 and the doped polysilicon plugs filling the contact holes 13, 15 are present for the obvious, art-recognized purpose of conducting current from drain wiring 14 and source wiring 16 to the drain 8 and the source 9, respectively. The fact that the plugs filling the contact holes 13, 15 comprise polysilicon is what makes them gettering sites, not that they comprise doped polysilicon. Any advantage in gettering that *might* exist from the fact that the polysilicon is doped is neither recognized nor in any way suggested by Yamaguchi et al. This advantage is *only* recognized and disclosed in Applicant's own specification, not in the prior art.

Thus, Yamaguchi et al. disclose nothing more than highly conventional doping of semiconductor substrates to form active components such as the filling material of the contact holes 13, 15, which is entirely conventional. Yamaguchi et al. fail to disclose or suggest any improvement in gettering resulting from doping a polysilicon plug.

The Office Action failed to identify any such motivation. Thus, the Office Action failed to identify and state all of the legally required elements of a case of *prima facie* obviousness. Similarly, the Office Action failed to identify any facts showing why a person would have a reasonable expectation of success in obtaining improved gettering by doping the polysilicon in the scribe lines disclosed by Hattori et al. For these reasons, the combination of Hattori et al. and Yamaguchi et al. fails to provide any basis for a *prima facie* case of obviousness of Applicant's claimed invention as described in claims 1, 9 and 21. Therefore, the rejection should be withdrawn. Applicant respectfully requests the withdrawal of all rejections based on Hattori et al. and Yamaguchi et al.

With respect to the dependent claims, each of these claims adds further specificity to the claimed invention described in independent claims 1, 9 and 21, and so distinguish over the cited references for the same reasons as the independent claims and due to the additional features set forth therein which, in combination, would not have been obvious over the contended combination of prior art.

CONCLUSION

Applicant respectfully submits that for at least the foregoing reasons, Hattori et al. in combination with Yamaguchi et al. and Tseng fails to disclose or suggest Applicant's presently claimed invention, and that the Examiner has failed to state a factually correct or legally proper case of *prima facie* obviousness. Accordingly, Applicant respectfully requests the Examiner to reconsider and withdraw the rejection of Applicant's claims over the prior art, and to indicate that the claims are allowable. Applicant respectfully submits that all of the presently pending claims 1-15 and 21-25 are allowable over the art of record. Accordingly, Notice of Allowance is respectfully requested.

In the event issues remain in the prosecution of this application, Applicant requests that the Examiner telephone the undersigned attorney to expedite allowance of the application. Should a Petition for Extension of Time be necessary for the present Reply to the outstanding Office action to be timely filed (or if such a petition has been made and an additional extension is necessary) petition therefor is hereby made and, if any additional fees are required for the filing of this paper, the Commissioner is authorized to charge those fees to Deposit Account #18-0988, Docket No. F0556.

Respectfully submitted,
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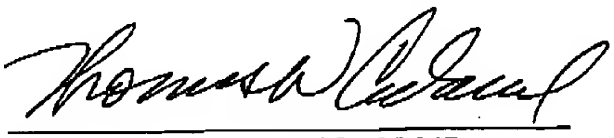

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